

## CLAIMS

What is claimed is:

1 1. A method for generating and transmitting bit rate conversion information, the method  
2 comprising:

3 receiving a sequence of media signals, the sequence of media signals  
4 is to be transmitted over a communication channel;

5 applying at least two bit rate conversion scheme on the sequence of  
6 media signals; and

7 analyzing the results of the appliance of the at least two bit rate  
8 conversion scheme to provide bit rate conversion information.

1 2. The method of claim 1 further comprising a step of transmitting at least a portion of  
2 the bit rate conversion information over the communication channel.

1 3. The method of claim 2 wherein the step of transmitting at least a portion of the bit  
2 rate conversion information is preceded by a step of multiplexing the at least portion of the  
3 bit rate conversion information with the sequence of media signals.

1 4. The method of claim 1 wherein the bit rate conversion information indicates (a) the at  
2 least one bit rate conversion scheme applied on the sequence of media signals, and (b)  
3 at least one amount of bit rate conversion resulting from the appliance of the at least one  
4 bit rate conversion scheme.

1 5. The method of claim 4 wherein the bit rate conversion further indicates at least one  
2 quality loss resulting from the appliance of the at least one bit rate conversion scheme.

1 6. The method of claim 1 wherein the bit rate conversion schemes are selected from the  
2 group consisting of:

- 3 removing filler packets;
- 4 removing filler frames;
- 5 removing stuffing bits;
- 6 selectively scaling DCT coefficients to zero;
- 7 selectively setting DCT coefficients to zero;
- 8 discarding data used to represent selected media frames;
- 9 discarding data used to represent selected media frames and generating repeat  
10 information in the bit stream such that a decoder can repeat the dropped frames;
- 11 re-quantizing quantized DCT coefficients;
- 12 extracting and changing the quantization scale factors;
- 13 decode and encode at different bit rates; and
- 14 changing the resolution of a video image.

1 7. The method of claim 1 wherein the steps of applying and analyzing are repeated to  
2 produce bit rate conversion information indicative of results of an appliance of a sequence  
3 of bit rate conversion schemes on the sequence of media signals.

1 8. The method of claim 7 further comprising the steps of:

- 2 transmitting the bit rate conversion information and the media signals sequence
- 3 until there is a need to convert the bit rate of the media signals sequence by applying a
- 4 first bit rate conversion scheme out of the sequence of bit rate conversion schemes; and

5 applying the first bit rate conversion scheme, and discarding bit rate conversion  
6 information relating to the first bit rate conversion information to provide modified bit rate  
7 conversion information.

1 9. The method of claim 1 wherein the media signals selected from a group consisting of:  
2 signals representative of visual information;  
3 compressed signals representative of visual information;  
4 MPEG compliant signals;  
5 signals representative of audio information;  
6 compressed signals representative of audio information;  
7 information signals associated with signals representative of visual information;  
8 information signals associated with compressed signals representative of visual  
9 information;  
10 information signals associated with MPEG compliant signals;  
11 information signals associated with signals representative of audio information;  
12 information signals associated with compressed signals representative of audio  
13 information; and  
14 sequences of media signals.

1 10. The method of claim 1 wherein the bit rate conversion information is generated by a  
2 central analyzer.

1 11. In a distribution center configured to transmit a plurality of media streams to a  
2 plurality of receivers, a method for generating and transmitting bit rate conversion  
3 information, the method comprising:  
4 receiving at least one media stream, the at least one media stream

5 is to be transmitted over a communication channel;  
6 applying at least one bit rate conversion scheme on the at least one  
7 media stream;  
8 analyzing the results of the appliance of the at least one bit rate conversion  
9 scheme to provide bit rate conversion information.

1 12. The method of claim 11 further comprising a step of transmitting at least a portion of  
2 the bit rate conversion information over the communication channel.

1 13. The method of claim 12 wherein the step of transmitting at least a portion of the bit  
2 rate conversion information is preceded by a step of multiplexing the at least portion of the  
3 bit rate conversion information with the at least one media stream.

1 14. The method of claim 12 wherein the bit rate conversion information indicates (a) the  
2 at least one bit rate conversion scheme applied on the at least one media stream, and (b)  
3 at least one amount of bit rate conversion resulting from the appliance of the at least one  
4 bit rate conversion scheme.

1 15. The method of claim 14 wherein the bit rate conversion further indicates at least one  
2 quality loss resulting from the appliance of the at least one bit rate conversion scheme.

1 16. The method of claim 11 wherein the bit rate conversion schemes are selected  
2 from the group consisting of:

- 3 removing filler packets;
- 4 removing filler frames;
- 5 removing stuffing bits;
- 6 selectively scaling DCT coefficients to zero;

7 selectively setting DCT coefficients to zero;  
8 discarding data used to represent selected media frames;  
9 discarding data used to represent selected media frames and generating repeat  
10 information in the bit stream such that a decoder can repeat the dropped frames;  
11 re-quantizing quantized DCT coefficients;  
12 extracting and changing the quantization scale factors;  
13 decode and encode at different bit rates; and  
14 changing the resolution of a video image.

1 17. The method of claim 11 wherein the steps of applying and analyzing are repeated to  
2 produce bit rate conversion information indicative of results of an appliance of a sequence  
3 of bit rate conversion schemes on the at least one media streams.

1 18. The method of claim 17 further comprising the steps of:

2 transmitting the bit rate conversion information and the at least one media stream  
3 until there is a need to convert the bit rate of a media stream out of the at least one media  
4 streams by applying a first bit rate conversion scheme out of the sequence of bit rate  
5 conversion schemes; and

6 applying the first bit rate conversion scheme, and discarding bit rate conversion  
7 information relating to the first bit rate conversion information to provide modified bit rate  
8 conversion information.

1 19. The method of claim 11 wherein each media stream includes signals selected from a  
2 group consisting of:

3 signals representative of visual information;  
4 compressed signals representative of visual information;

1 20. The method of claim 11 wherein the bit rate conversion information is generated by a  
2 central analyzer.

21. A method for modifying a bit rate of a sequence of media signals such that the bit rate of the sequence of media signals does not exceed an available bandwidth of a communication channel, the method comprising the steps of:

4 receiving the media signal sequence, bandwidth information and bit  
5 rate conversion information;

6 determining whether to convert the bit rate of the sequence of media  
7 signals in view of bandwidth information and the bit rate conversion  
8 information; and

9           converting the bit rate of the sequence of media signals in response  
10   to the determination.

1 22. The method of claim 21 wherein the media signals comprising of at least two  
2 sequences of media signals, whereas each sequence of media signals is associated with  
3 a bit rate conversion information.

1 23. The method of claim 22 wherein each sequence of compressed media signals is  
2 representative of at least a portion of a program.

1 24. The method of claim 23 further comprising a step of selecting at least one of the at  
2 least two sequences to be provided to the channel and wherein converting the media  
3 signals in view of the selection.

1 25. The method of claim 24 wherein the step of reception is preceded by a step of  
2 multiplexing the at least two sequences of data media.

1 26. The method of claim 25 wherein the step of multiplexing is preceded by a step of  
2 generating bit rate conversion information.

1 27. The method of claim 21 wherein the bit rate conversion information being indicative of  
2 a bit rate conversion after performing at least of the following bit conversion step selected  
3 from the group consisting of:

- 4 removing filler packets;
- 5 removing filler frames;
- 6 removing stuffing bits;
- 7 selectively scaling DCT coefficients to zero;
- 8 selectively setting DCT coefficients to zero;
- 9 discarding data used to represent selected media frames;

10           discarding data used to represent selected media frames and generating repeat  
11 information in the bit stream such that a decoder can repeat the dropped frames;  
12           re-quantizing quantized DCT coefficients;  
13           extracting and changing the quantization scale factors;  
14           decode and encode at different bit rates; and  
15           changing the resolution of a video image.

1    28. The method of claim 21 wherein the bit rate conversion information is generated by a  
2    central analyzer.

1    29. The method of claim 28 wherein the bit rate conversion information is multiplexed  
2    with the media signals.

1    30. The method of claim 28 wherein each sequence of compressed digital signals  
2    represents a program.

1    31. The method of claim 21 wherein the bit rate conversion information further indicates  
2    of a quality degradation resulting from the appliance of a bit conversion scheme on the  
3    media signals; and the step of converting the media signals is further based upon the  
4    quality degradation.

1    32. The method of claim 21 wherein the media signals are associated with priority  
2    criteria, and wherein the step of converting the media signals is further based upon a  
3    priority associated with the media signals.

1    33. The method of claim 21 wherein the media signals are MPEG compliant signals.



1 34. The method of claim 33 wherein the media signals are arranged in MPEG compliant  
2 transport packets.

1 35. The method of claim 34 wherein the bit rate conversion information is embedded  
2 within the headers of the transport packets.

1 36. The method of claim 21 wherein the steps of applying and analyzing are repeated to  
2 produce bit rate conversion information indicative of results of an appliance of a sequence  
3 of bit rate conversion schemes on the sequence of media signals.

1 37. The method of claim 36 further comprising the steps of:  
2 transmitting the bit rate conversion information and the at least one media stream  
3 until there is a need to convert the bit rate of a media stream by applying a first bit rate  
4 conversion scheme out of the sequence of bit rate conversion schemes; and  
5 applying the first bit rate conversion scheme, and discarding bit rate conversion  
6 information relating to the first bit rate conversion information to provide modified bit rate  
7 conversion information.

1 38. An apparatus for generating and transmitting bit rate conversion information, the  
2 apparatus comprising:

3 at least one bit rate converter for receiving a sequence of media  
4 signals to be transmitted over a communication channel, and for applying  
5 at least one bit rate conversion scheme on the sequence of media signals  
6 to provide a bit rate converted sequence of media signals;

7 at least one bit rate conversion analyzer, coupled to the at least one  
8 bit rate converters, for receiving and analyzing the bit rate converted

9 sequence of media signals and providing bit rate conversion information.

1 39. The apparatus of claim 38 further comprising a transmitter, coupled between the at  
2 least one bit rate conversion analyzer and the communication channel, for receiving and  
3 transmitting over the communication channel at least a portion of the bit rate conversion  
4 information.

1 40. The apparatus of claim 38 further comprising a multiplexer, coupled between the at  
2 least one bit rate conversion analyzer and the communication channel, the multiplexer is  
3 configured to receive and multiplex the sequence of media signals and at least a portion  
4 of the bit rate conversion information.

1 41. The apparatus of claim 38 wherein the bit rate conversion information indicates (a)  
2 the at least one bit rate conversion scheme applied on the sequence of media signals,  
3 and (b) at least one amount of bit rate conversion resulting from the appliance of the at  
4 least one bit rate conversion scheme.

1 42. The apparatus of claim 41 wherein the bit rate conversion further indicates at least  
2 one quality loss resulting from the appliance of the at least one bit rate conversion  
3 scheme.

1 43. The apparatus of claim 38 wherein the bit rate conversion schemes are selected from  
2 the group consisting of:

- 3 removing filler packets;
- 4 removing filler frames;
- 5 removing stuffing bits;
- 6 selectively scaling DCT coefficients to zero;

7 selectively setting DCT coefficients to zero;  
8 discarding data used to represent selected media frames;  
9 discarding data used to represent selected media frames and generating repeat  
10 information in the bit stream such that a decoder can repeat the dropped frames;  
11 re-quantizing quantized DCT coefficients;  
12 extracting and changing the quantization scale factors;  
13 decode and encode at different bit rates; and  
14 changing the resolution of a video image.

1 44. The apparatus of claim 38 wherein at least one pair of bit rate converter and bit rate  
2 conversion analyzer are configured to apply a sequence of bit rate conversion schemes  
3 on a sequence of media signals and to provide bit rate conversion information indicative  
4 of results of the appliance of the sequence of bit rate conversion schemes on the  
5 sequence of media signals.

1 45. The apparatus of claim 38 wherein the media signals selected from a group  
2 consisting of:

3 signals representative of visual information;  
4 compressed signals representative of visual information;  
5 MPEG compliant signals;  
6 signals representative of audio information;  
7 compressed signals representative of audio information;  
8 information signals associated with signals representative of visual information;  
9 information signals associated with compressed signals representative of visual  
10 information;  
11 information signals associated with MPEG compliant signals;

12 information signals associated with signals representative of audio information;  
13 information signals associated with compressed signals representative of audio  
14 information; and  
15 sequences of media signals.

1 46. The apparatus of claim 38 further configured to transmit the sequences of bit rate  
2 conversion information and the sequence of media signals to multiple receivers.

1 47. The apparatus of claim 46 being located within a central distribution center.

1 48. The apparatus of claim 46 wherein the receivers are local distribution centers.

1 49. An apparatus for generating and transmitting bit rate conversion information, the  
2 apparatus comprising:

3 at least one bit rate converter for receiving at least one stream of  
4 media signals to be transmitted over a communication channel, and  
5 for applying at least one bit rate conversion scheme on the at least one  
6 media stream to provide at least one bit rate converted media signal;

7 at least one bit rate conversion analyzer, coupled to the at least one  
8 bit rate converters, for receiving and analyzing the at least one bit rate converted media  
9 streams and for providing bit rate conversion information.

1 50. The apparatus of claim 49 further comprising a transmitter, coupled between the at  
2 least one bit rate conversion analyzer and the communication channel, for receiving and  
3 transmitting over the communication channel at least a portion of the bit rate conversion  
4 information.

1 51. The apparatus of claim 49 further comprising a multiplexer, coupled between the at  
2 least one bit rate conversion analyzer and the communication channel, the multiplexer is  
3 configured to receive and multiplex the at least one media stream and at least a portion of  
4 the bit rate conversion information.

1 52. The apparatus of claim 49 wherein the bit rate conversion information indicates (a)  
2 the at least one bit rate conversion scheme applied on the at least one media stream, and  
3 (b) at least one amount of bit rate conversion resulting from the appliance of the at least  
4 one bit rate conversion scheme.

1 53. The apparatus of claim 52 wherein the bit rate conversion further indicates at least  
2 one quality loss resulting from the appliance of the at least one bit rate conversion  
3 scheme.

1 54. The apparatus of claim 49 wherein the bit rate conversion schemes are selected from  
2 the group consisting of:

- 3 removing filler packets;
- 4 removing filler frames;
- 5 removing stuffing bits;
- 6 selectively scaling DCT coefficients to zero;
- 7 selectively setting DCT coefficients to zero;
- 8 discarding data used to represent selected media frames;
- 9 discarding data used to represent selected media frames and generating repeat
- 10 information in the bit stream such that a decoder can repeat the dropped frames;
- 11 re-quantizing quantized DCT coefficients;
- 12 extracting and changing the quantization scale factors;

13 decode and encode at different bit rates; and  
14 changing the resolution of a video image.

1 55. The apparatus of claim 49 wherein at least one pair of bit rate converter and bit rate  
2 conversion analyzer are configured to apply a sequence of bit rate conversion schemes  
3 on a at least one media stream and to provide bit rate conversion information indicative of  
4 results of the appliance of the sequence of bit rate conversion schemes on the at least  
5 one media stream.

1 56. The apparatus of claim 49 wherein the media streams comprising at least one signal  
2 selected from a group consisting of:  
3 signals representative of visual information;  
4 compressed signals representative of visual information;  
5 MPEG compliant signals;  
6 signals representative of audio information;  
7 compressed signals representative of audio information;  
8 information signals associated with signals representative of visual information;  
9 information signals associated with compressed signals representative of visual  
10 information;  
11 information signals associated with MPEG compliant signals;  
12 information signals associated with signals representative of audio information;  
13 information signals associated with compressed signals representative of audio  
14 information; and  
15 sequences of media signals.



1 64. The apparatus of claim 62 further comprising a multiplexer, coupled between the  
2 communication channel and the bit rate converter, for multiplexing the at least two  
3 sequences of data media.

1 65. The apparatus of claim 60 wherein the bit rate conversion information being indicative  
2 of a bit rate conversion after performing at least of the following bit conversion step  
3 selected from the group consisting of:

4 removing filler packets;  
5 removing filler frames;  
6 removing stuffing bits;  
7 selectively scaling DCT coefficients to zero;  
8 selectively setting DCT coefficients to zero;  
9 discarding data used to represent selected media frames;  
10 discarding data used to represent selected media frames and generating repeat  
11 information in the bit stream such that a decoder can repeat the dropped frames;  
12 re-quantizing quantized DCT coefficients;  
13 extracting and changing the quantization scale factors;  
14 decode and encode at different bit rates; and  
15 changing the resolution of a video image.

1 66. The apparatus of claim 60 wherein the bit rate conversion information is generated by  
2 a central analyzer.

1 67. The apparatus of claim 66 wherein the bit rate conversion information is multiplexed  
2 with the media signals.



1 68. The apparatus of claim 66 wherein the sequence of media signals are associated  
2 with priority criteria, and wherein the step of converting the media signals is further based  
3 upon a priority associated with the media signals.

1 69. The apparatus of claim 60 wherein the media signals are MPEG compliant signals.

1 70. The apparatus of claim 60 wherein the media signals are arranged in MPEG  
2 compliant transport packets.

1 71. The apparatus of claim 70 wherein the bit rate conversion information is embedded  
2 within the headers of the transport packets.

1 72. The apparatus of claim 60 further configured to modify bit rate conversion  
2 information, to reflect bit rate conversion schemes that were applied by the bit rate  
3 converter.

1 73. The apparatus of claim 72 wherein the bit rate conversion information being indicative  
2 of results of an appliance of sequence of bit rate conversion schemes on the sequence of  
3 media signals.